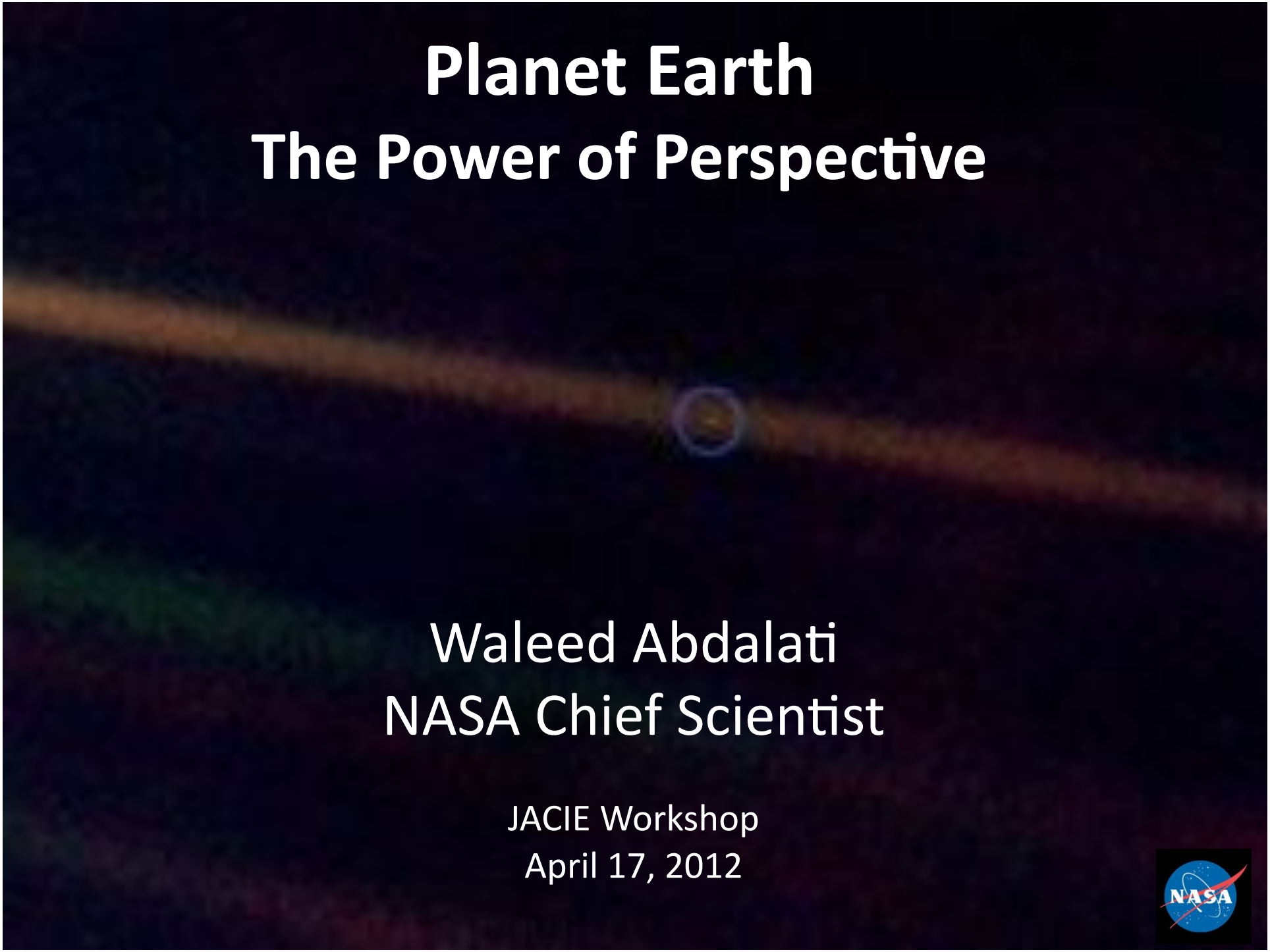
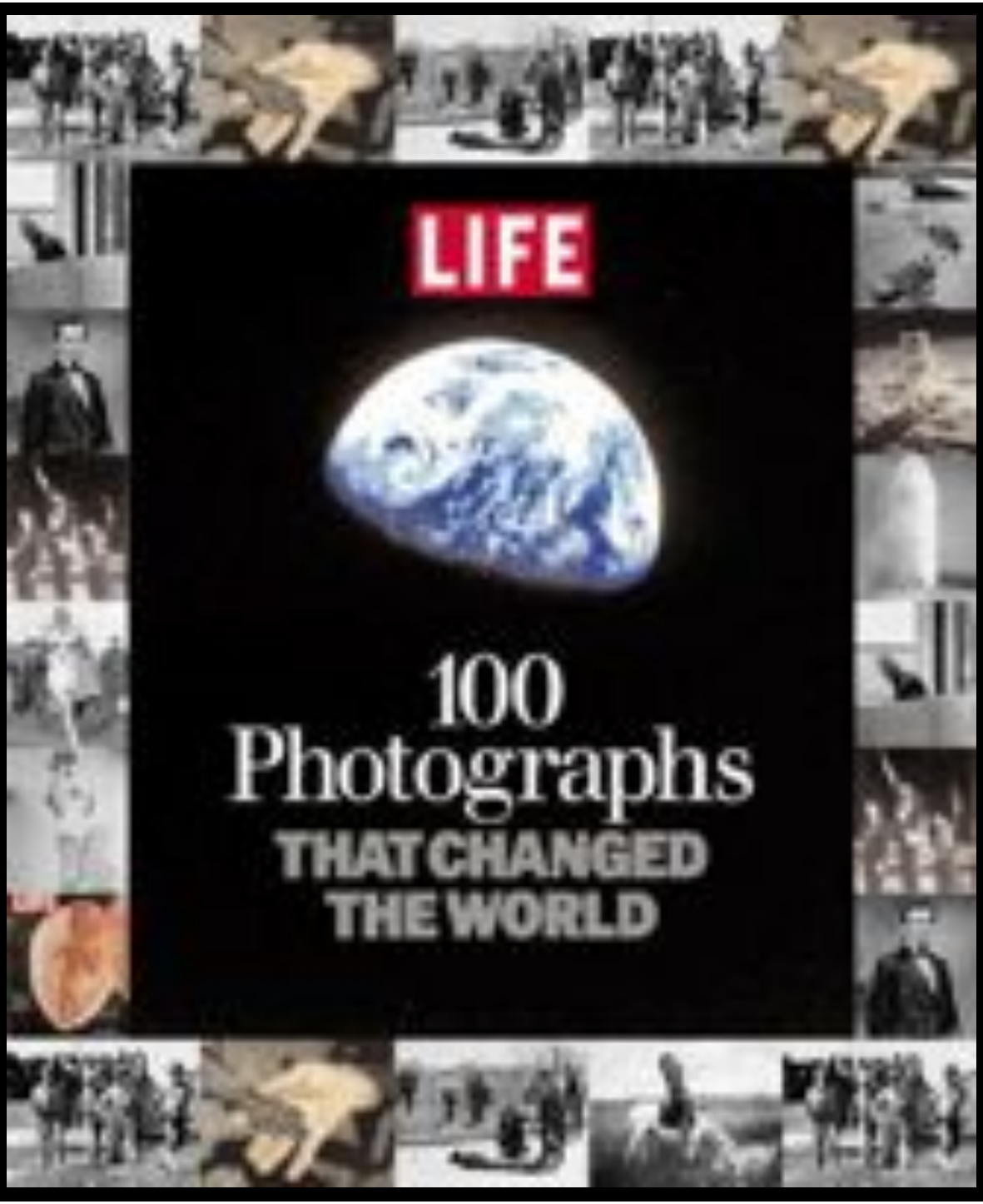


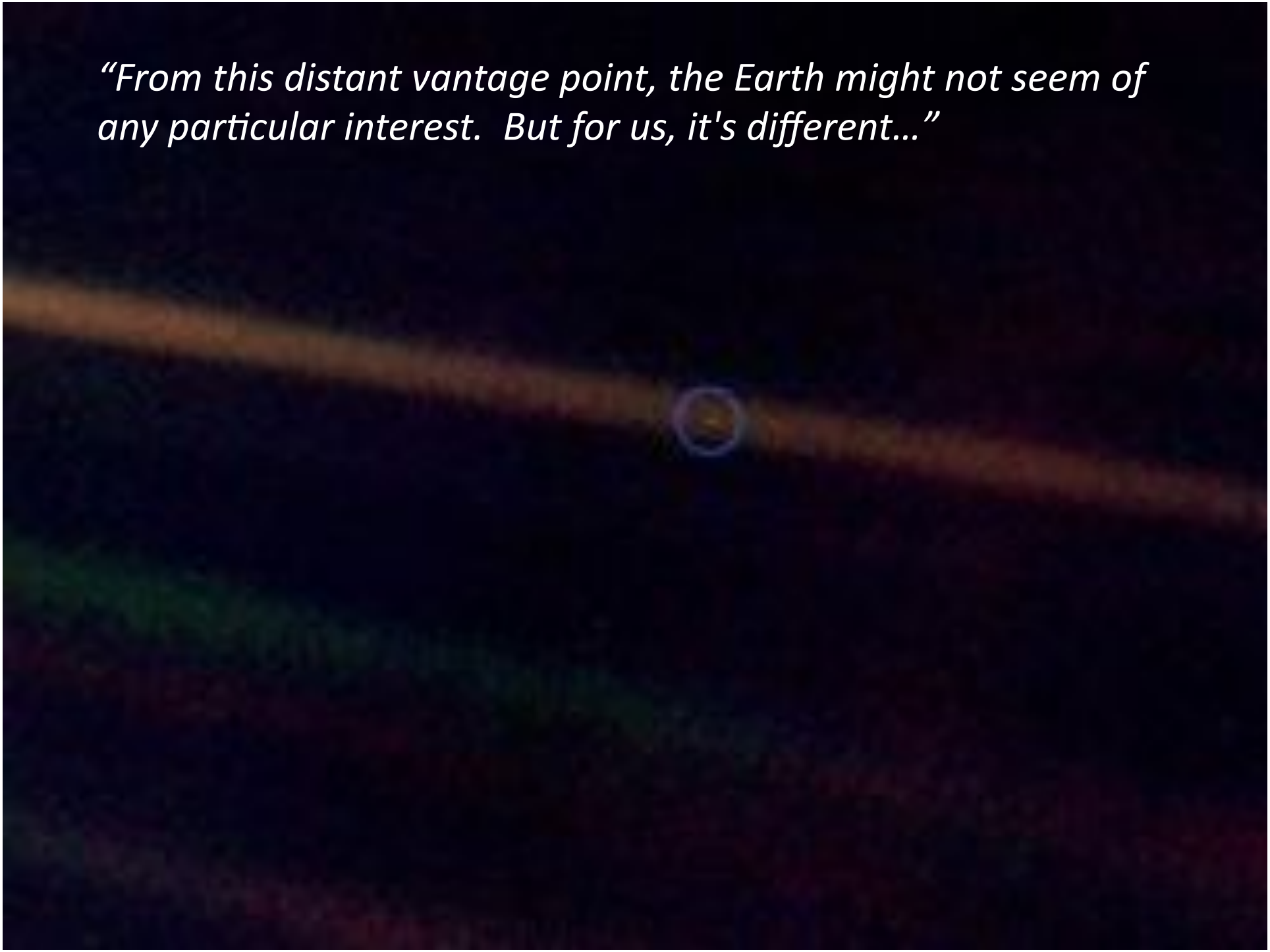
Planet Earth
The Power of Perspective

Waleed Abdalati
NASA Chief Scientist

JACIE Workshop
April 17, 2012

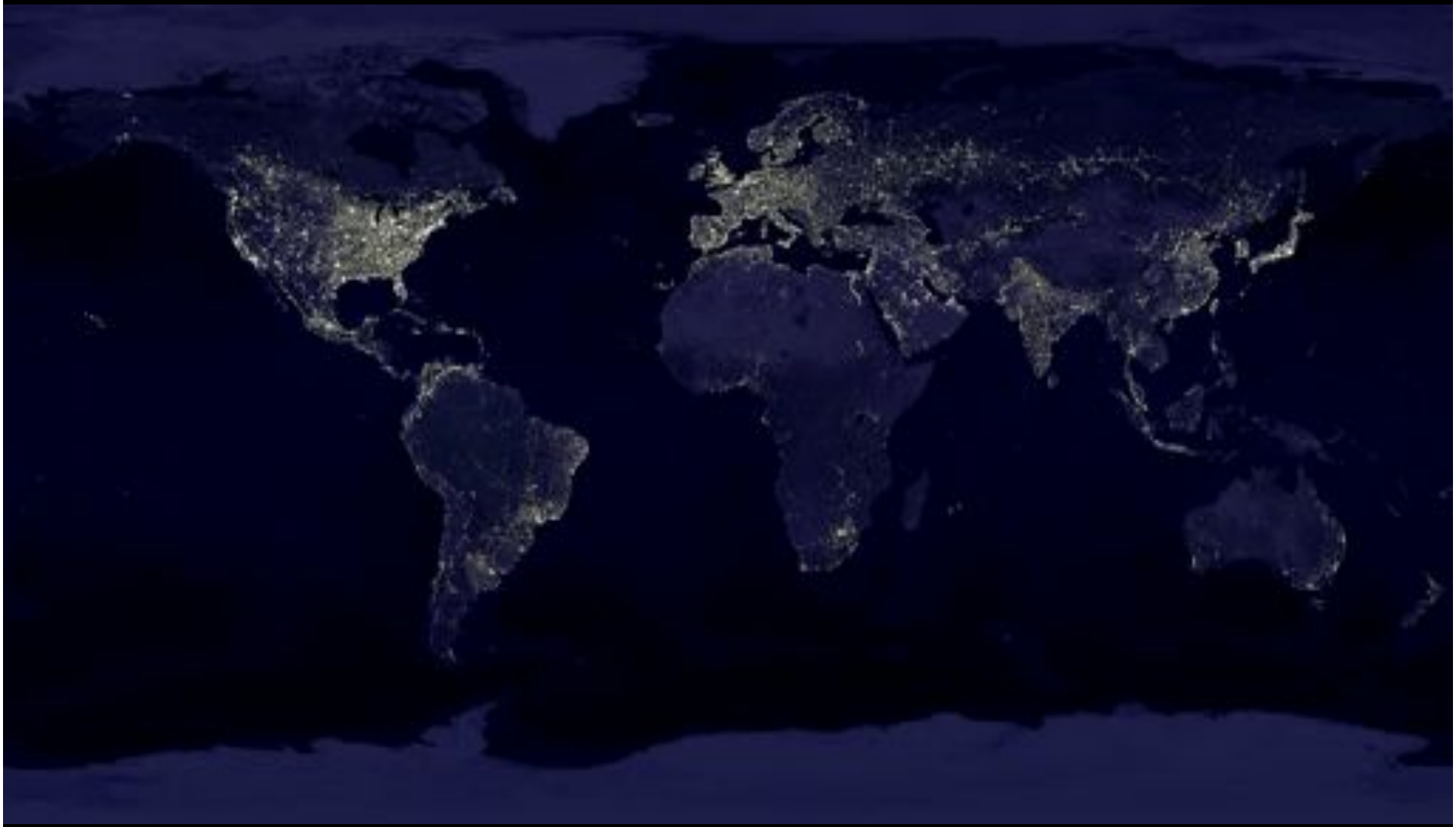


© Life, 2003


“From this distant vantage point, the Earth might not seem of any particular interest. But for us, it's different…”

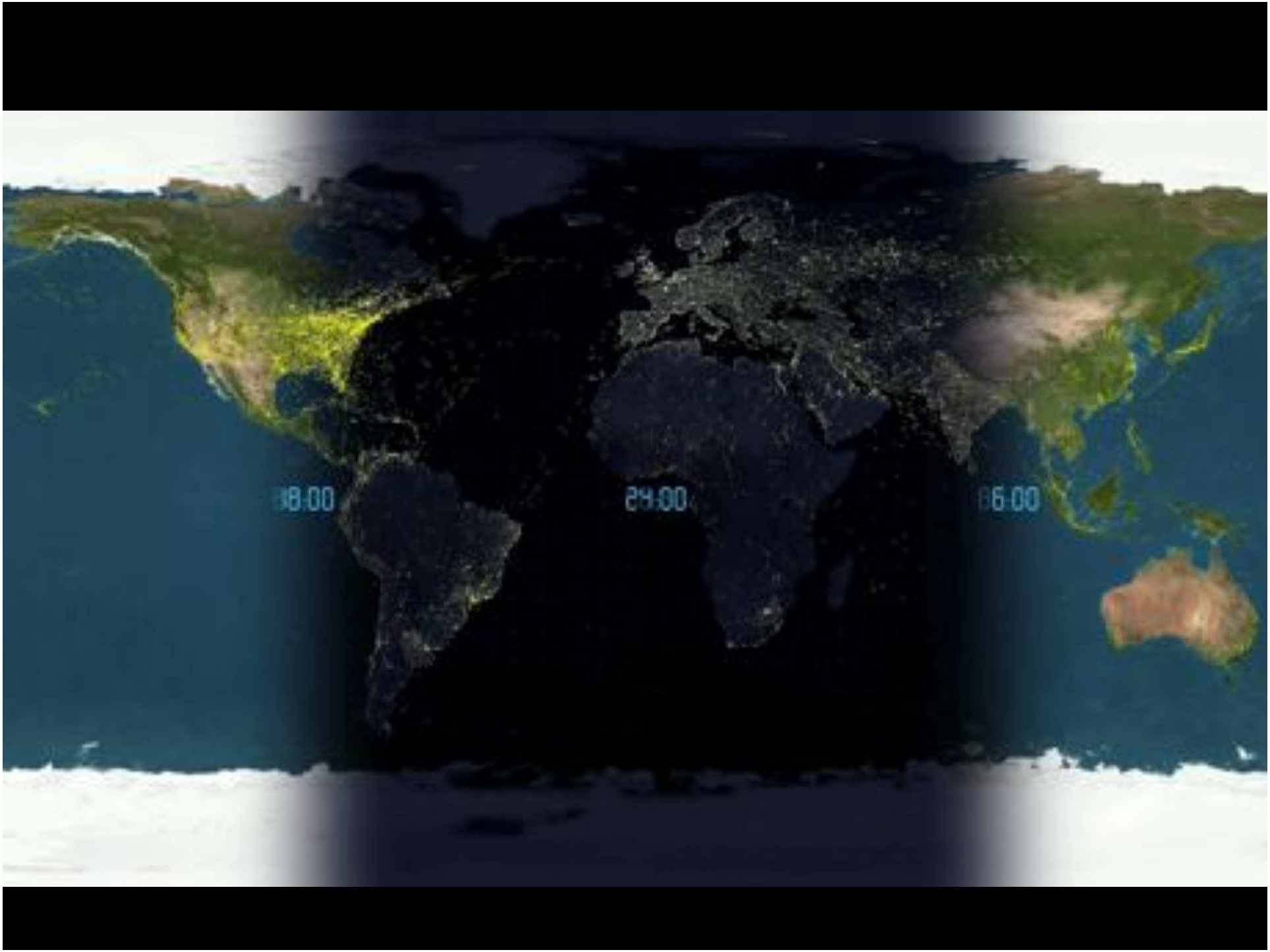
“That's here, that's home, that's us.”

- Carl Sagan

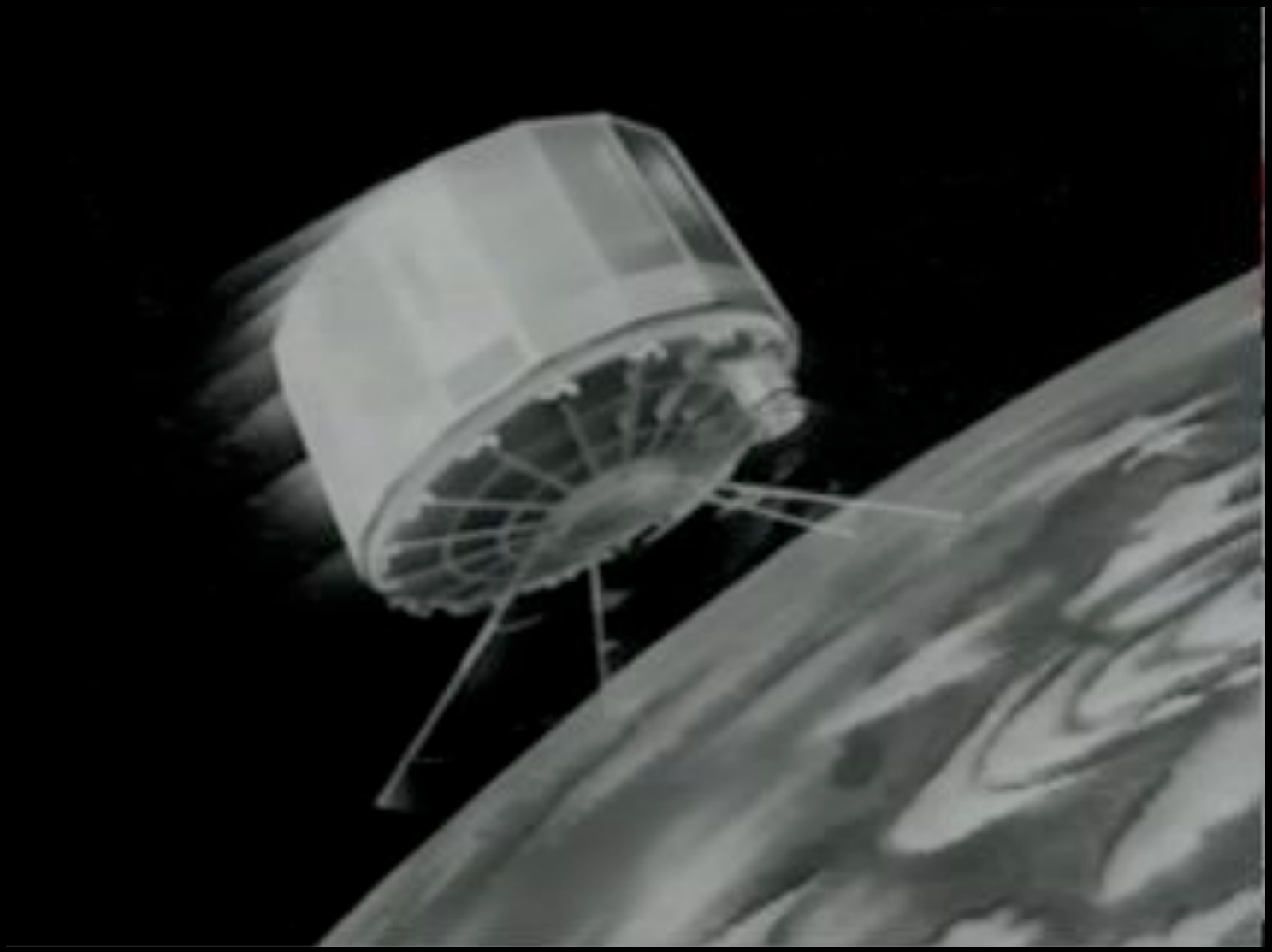



NASA

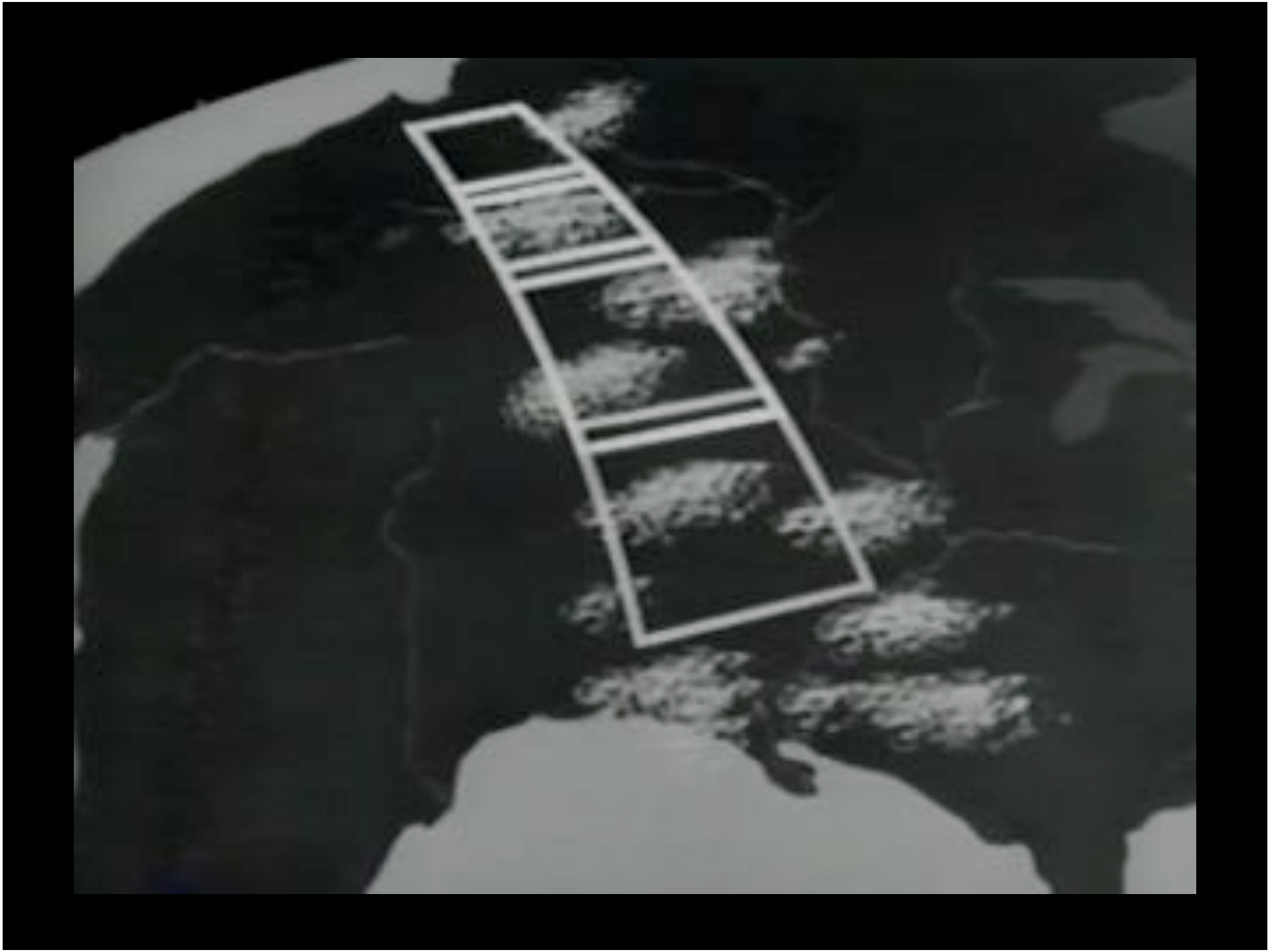

NASA

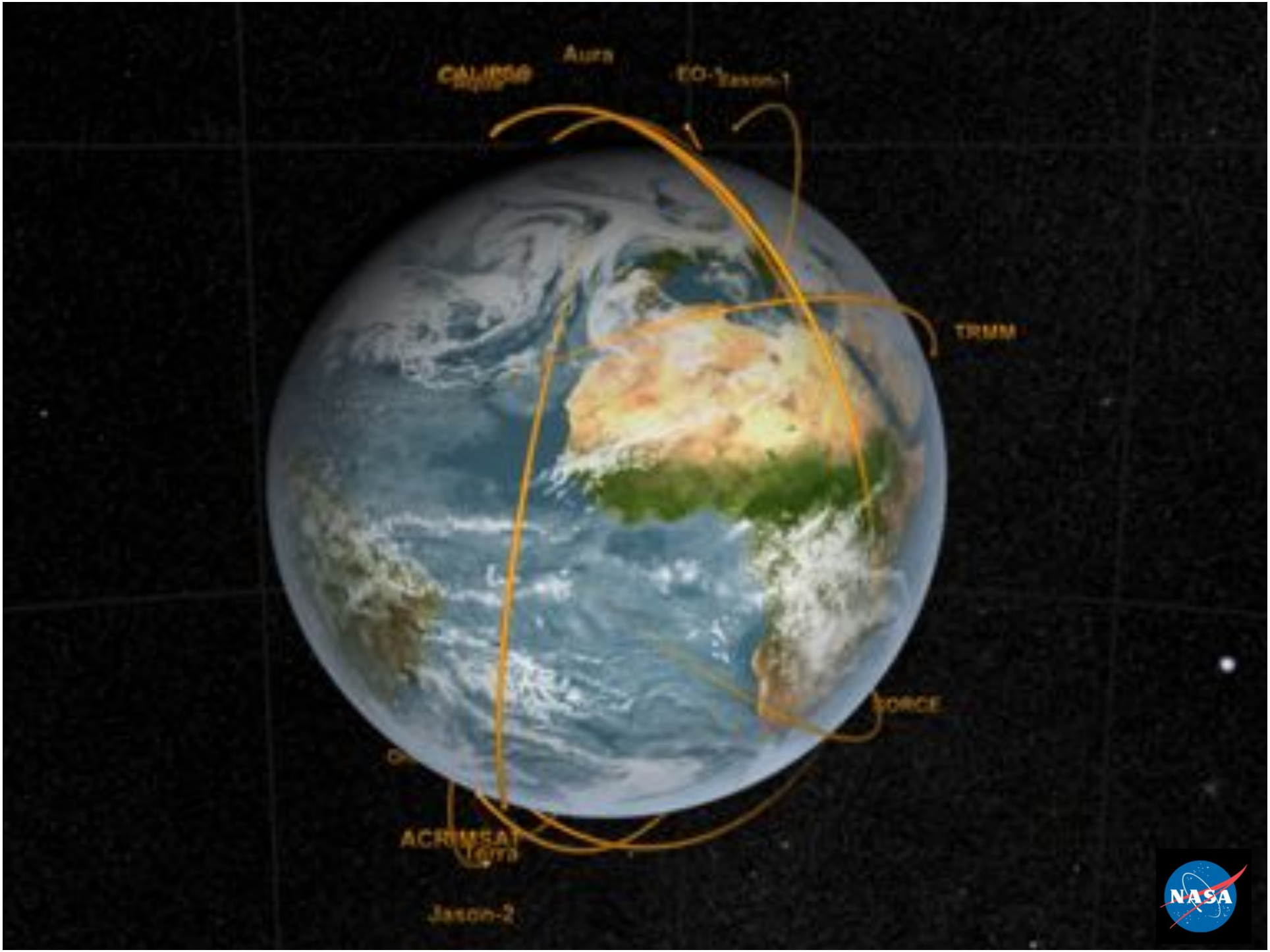

18:00
24:00
6:00

A flying ladies' hat box?

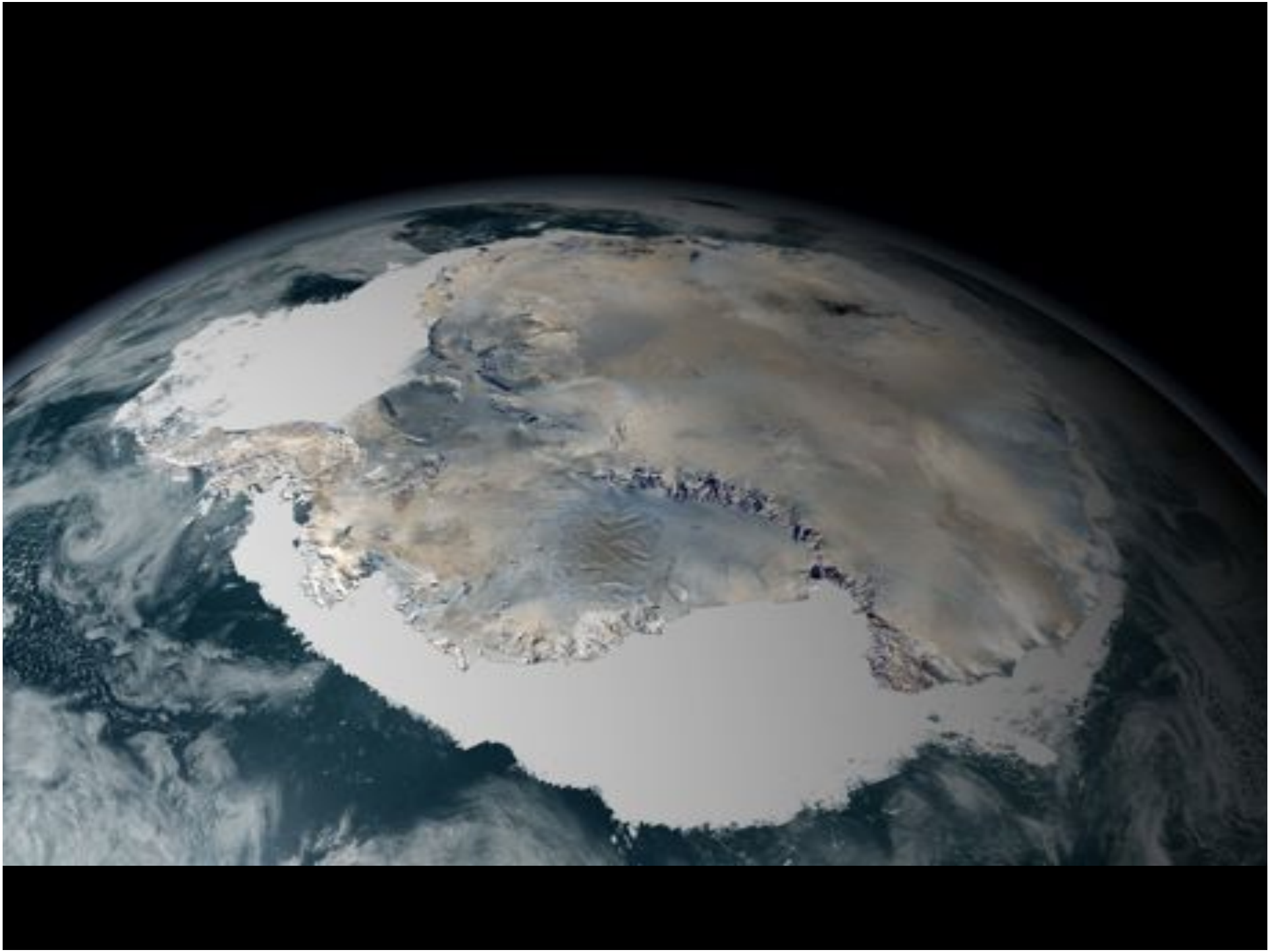


Graphic animation supplied by the National Aeronautics and Space Administration

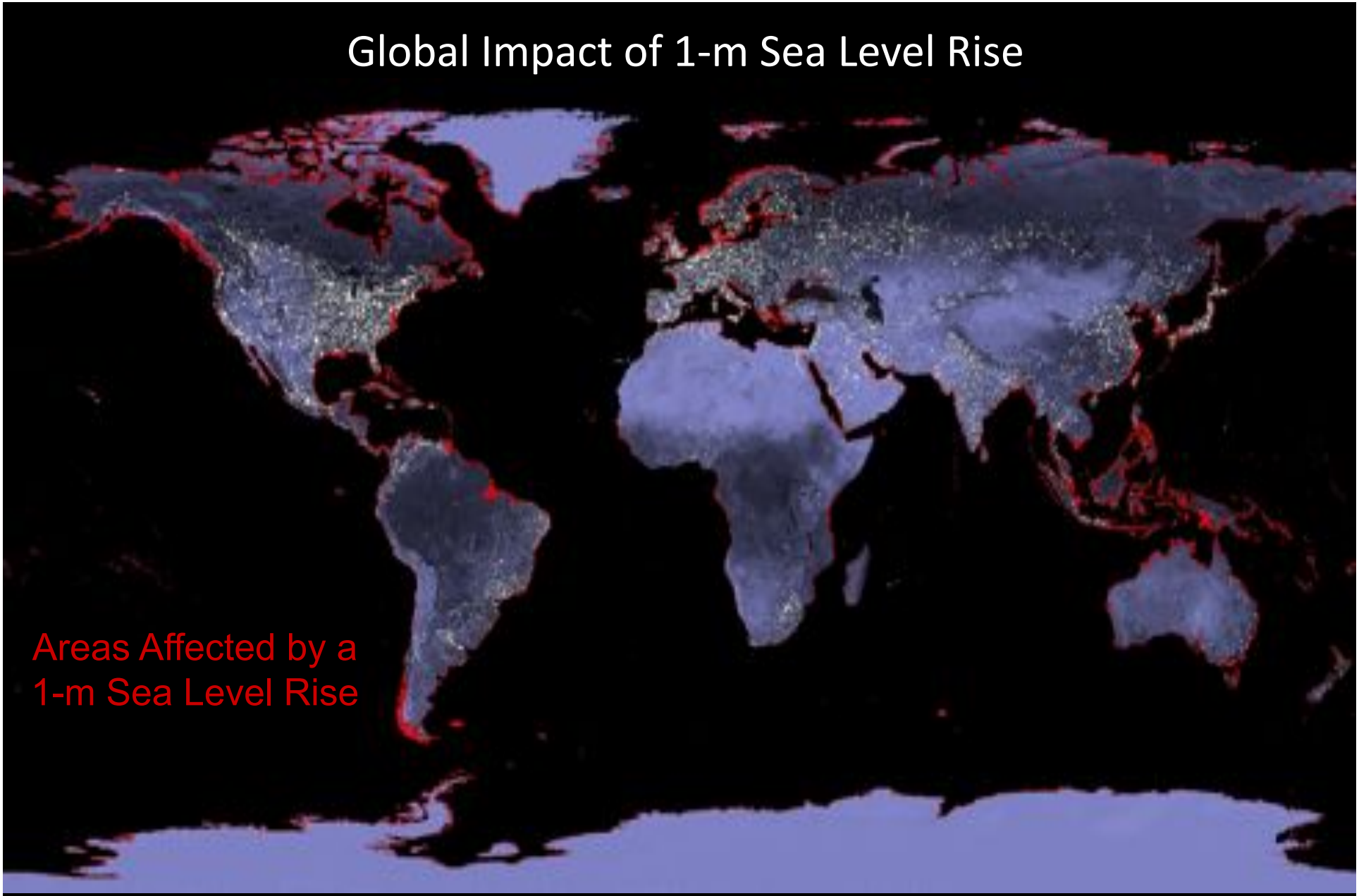



Aura
EO-1
TRMM
ACRIMSAT
Jason-2
NASA

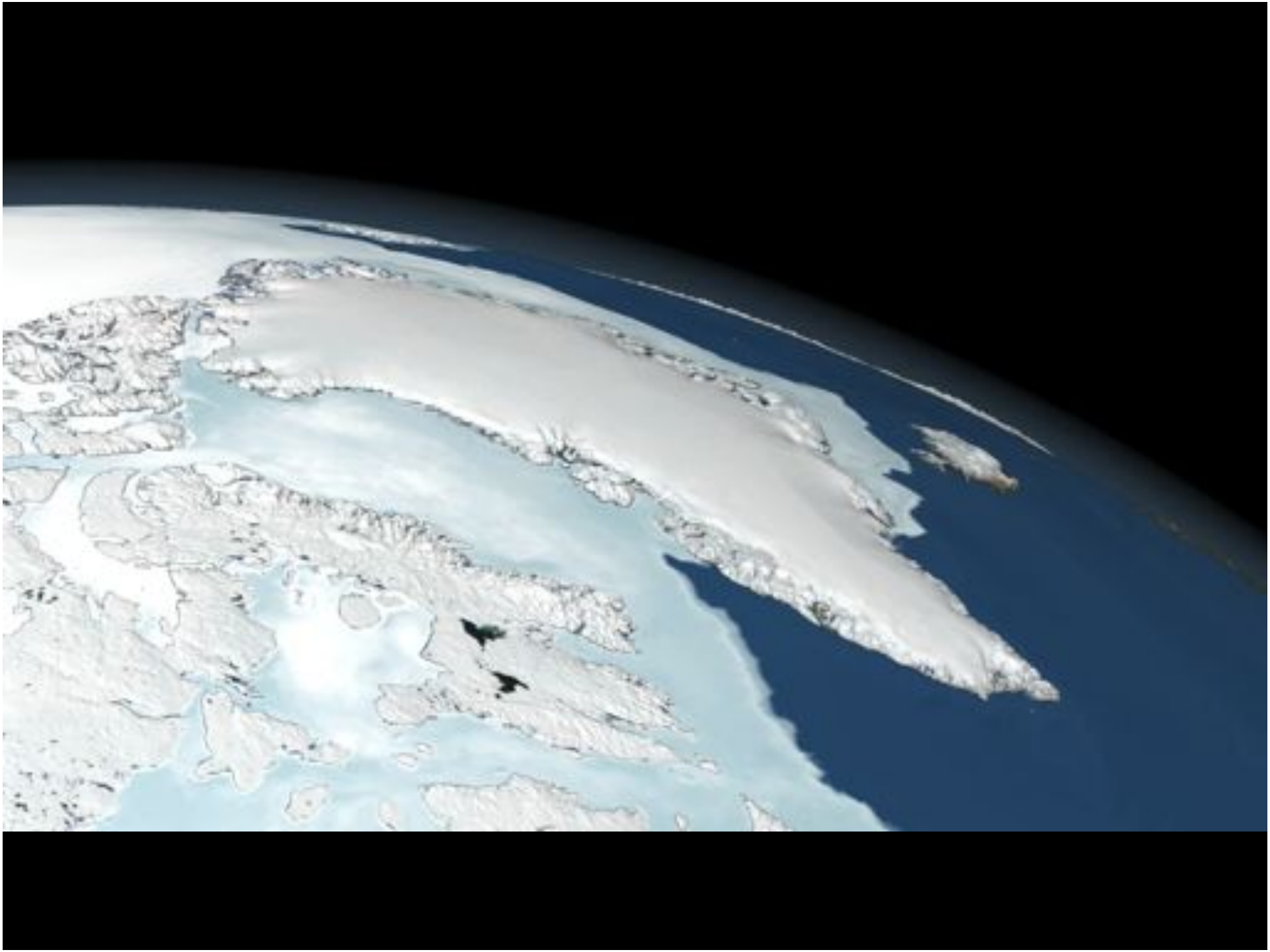

NASA



Global Impact of 1-m Sea Level Rise

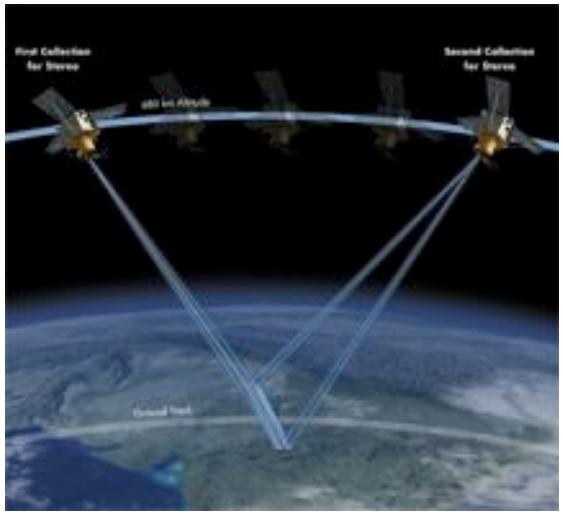


1 meter of sea level rise can affect up to 145,000,000 people
at a cost of nearly 1,000,000,000,000 $US (Anthoff et al., 2006)

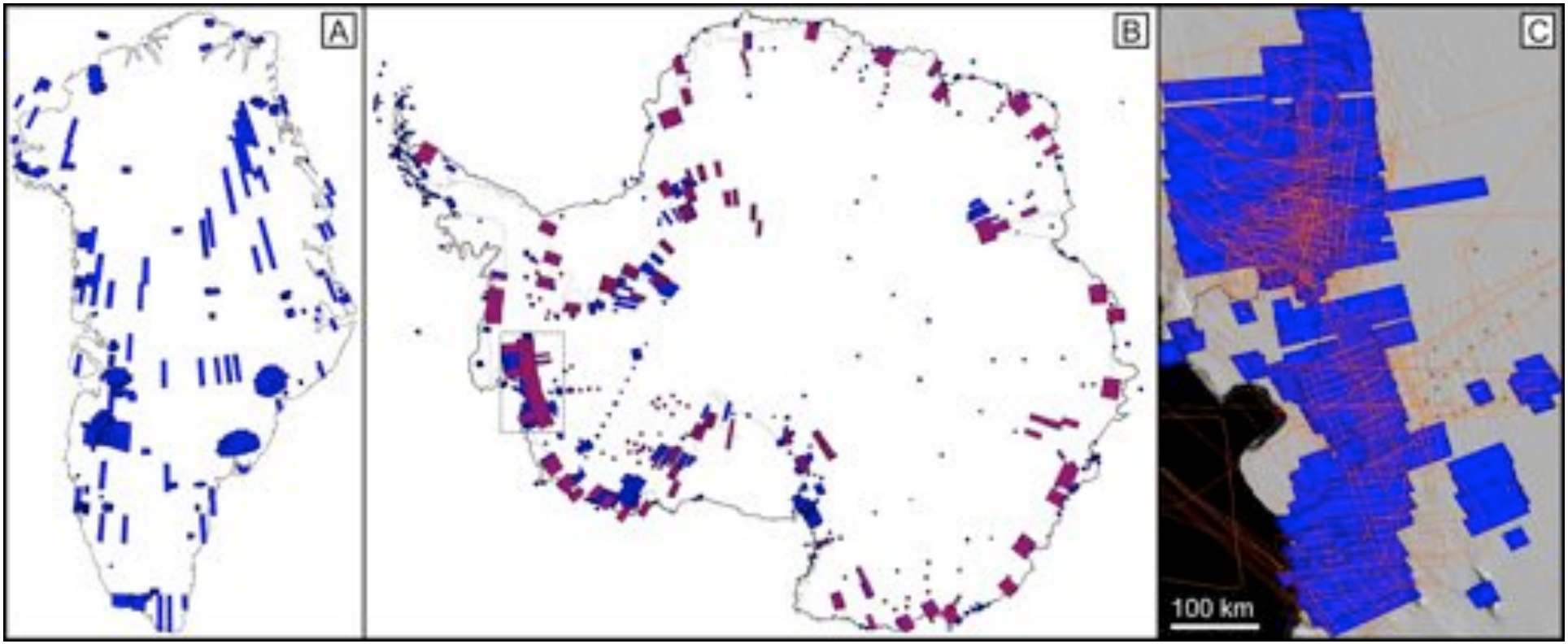


Commercial, High-res Stereo Imagery

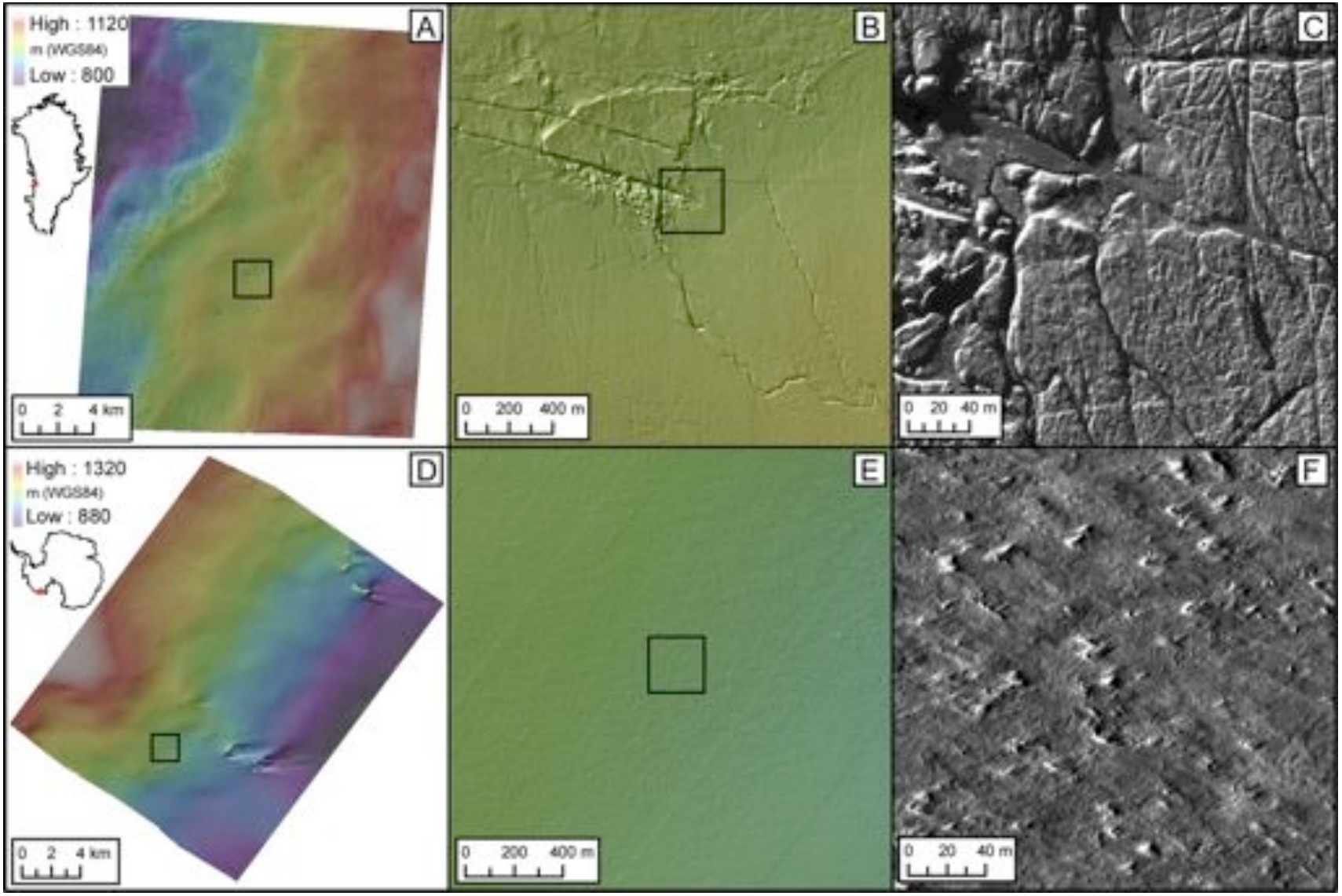
- NGA facilitated NASA access to DigitalGlobe (Worldview 1/2, Quickbird) & Geoeye (Geoeye 1, IKONOS) imagery; 0.46 m/px, ~17 km swath width
- Phenomenal resource for polar science; the imagery is used for most polar field programs
- Routine monitoring of ice processes, especially ice-ocean interaction, the greatest unknown in sea level rise models
- Generating DEMs w/ comparabel. precision to lidar and allowing monitoring of meter scale change
- Open source, automated work performed by a cooperative of U. Washington/NASA-Ames/U. Minnesota/Ohio State



Combined DG+GE Stereo Coverage (as of 1/16/2012)

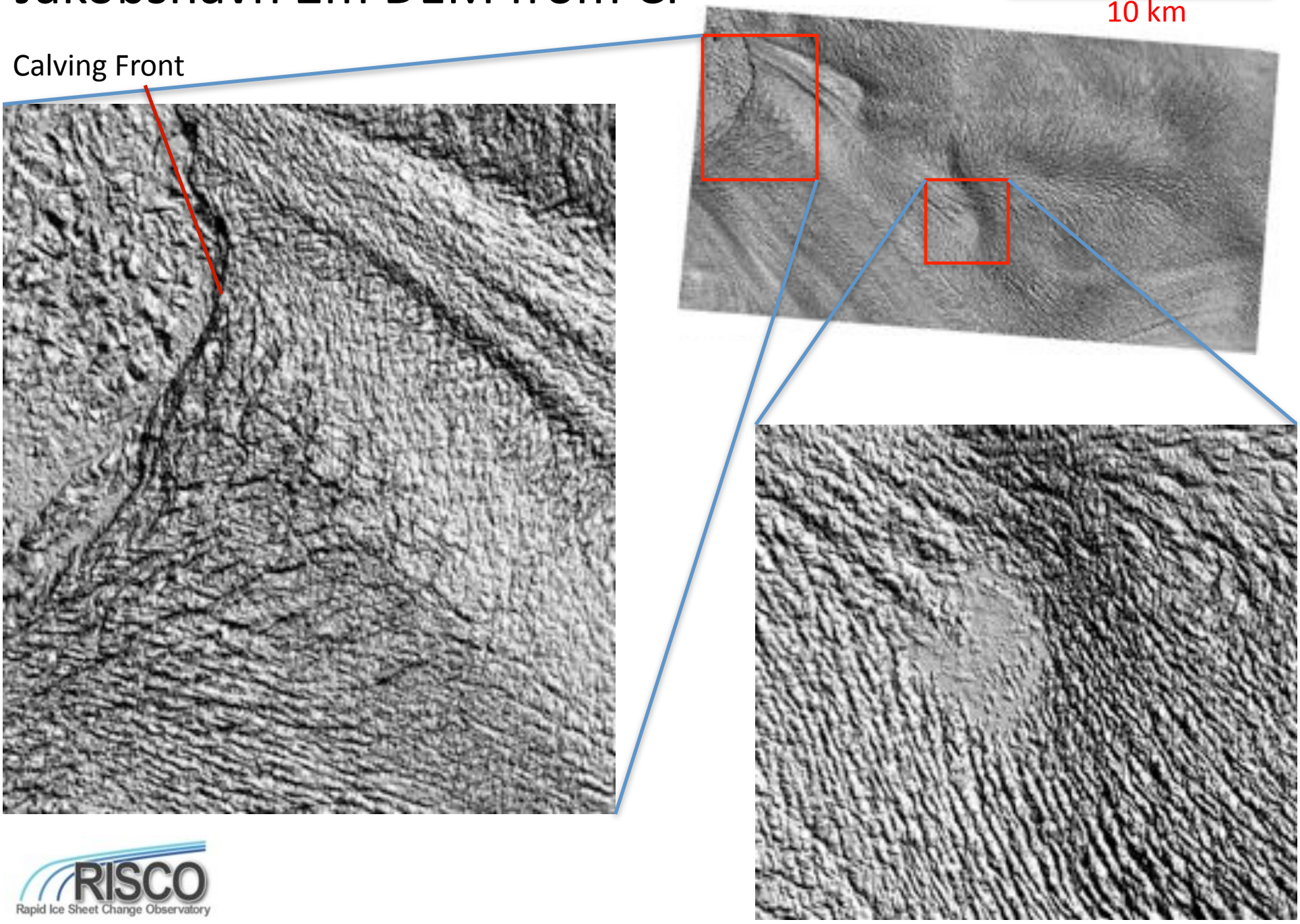


Antarctica - ~2700 pairs (~1000 w/ cloud cover <20%)
Greenland - ~800 pairs (~400 w/ cloud cover <20%



Sample DEMs derived from Worldview-2 stereo imagery. A) DEM of lakes region in West Greenland. B) Detail of [A] showing drained meltwater lake basin. Note excellent characterization of stream channels and fractures. C) Portion of ~0.5 m/px image used for DEM generation. D) DEM of "featureless," smooth region in West Antarctica. E) Detail of [D]. F) Portion of image used for DEM generation. Note meter-scale surface features that provide near-perfect correlation rates. These features are not apparent in lower-resolution images (e.g. ASTER), which often suffer from failed correlation over "featureless" surfaces.

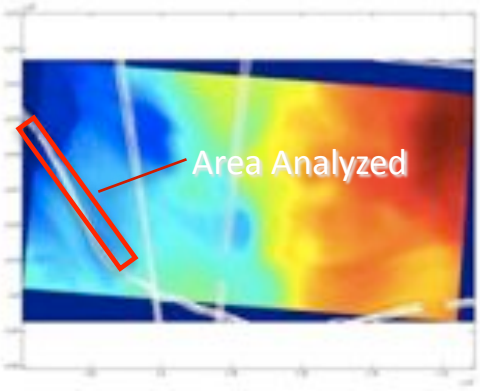
Jakobshavn 2m DEM from CI



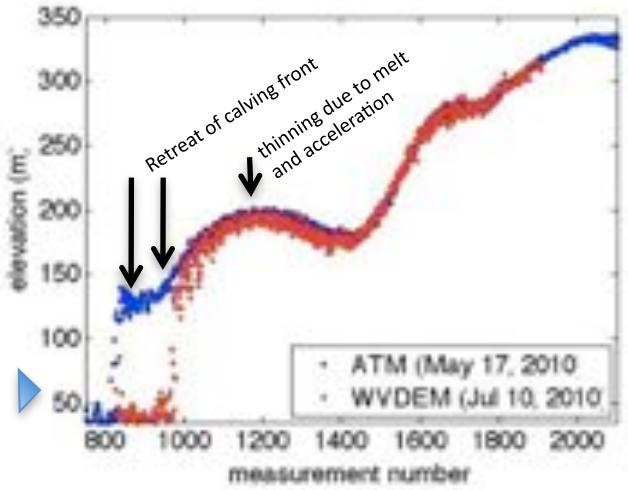
RISCO
Rapid Ice Sheet Change Observatory

Commercial Imagery DEM-Lidar Comparison

July 10, 2010 DEM with Airborne Topographic Mapper (ATM) lidar tracks May, 17 2010

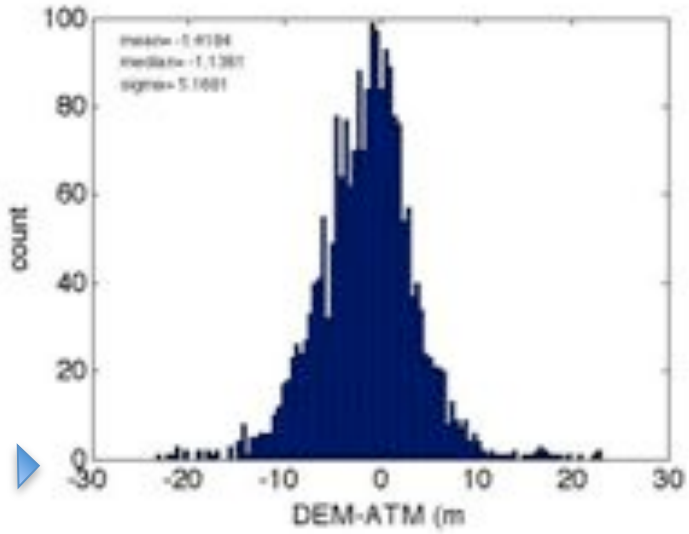


ATM measurements (blue dots) and DEM measurements (red dots) along main flow line, denoted by the red box on the map.



- The mean offset (-1.4 m) between DEM and lidar elevations can be accounted for by ice thinning (2.6 cm/day).
- The standard deviation (5.2 m) can be accounted for by surface roughness.
- Conclusion: DEM produces comparable accuracy to repeat-lidar over rough surfaces.

Histogram and statistics of all differences between DEM and ATM elevations, excluding front retreat.



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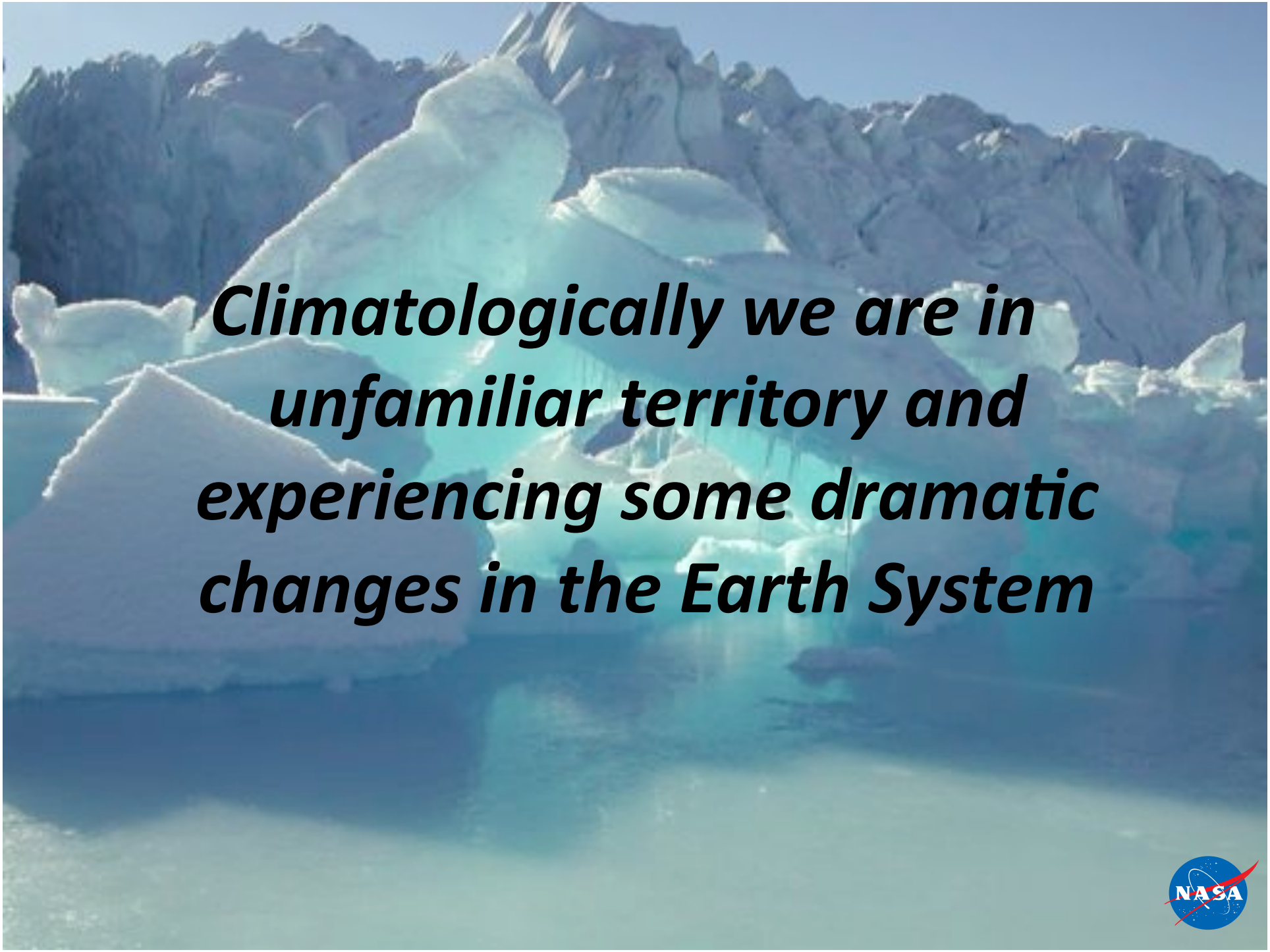
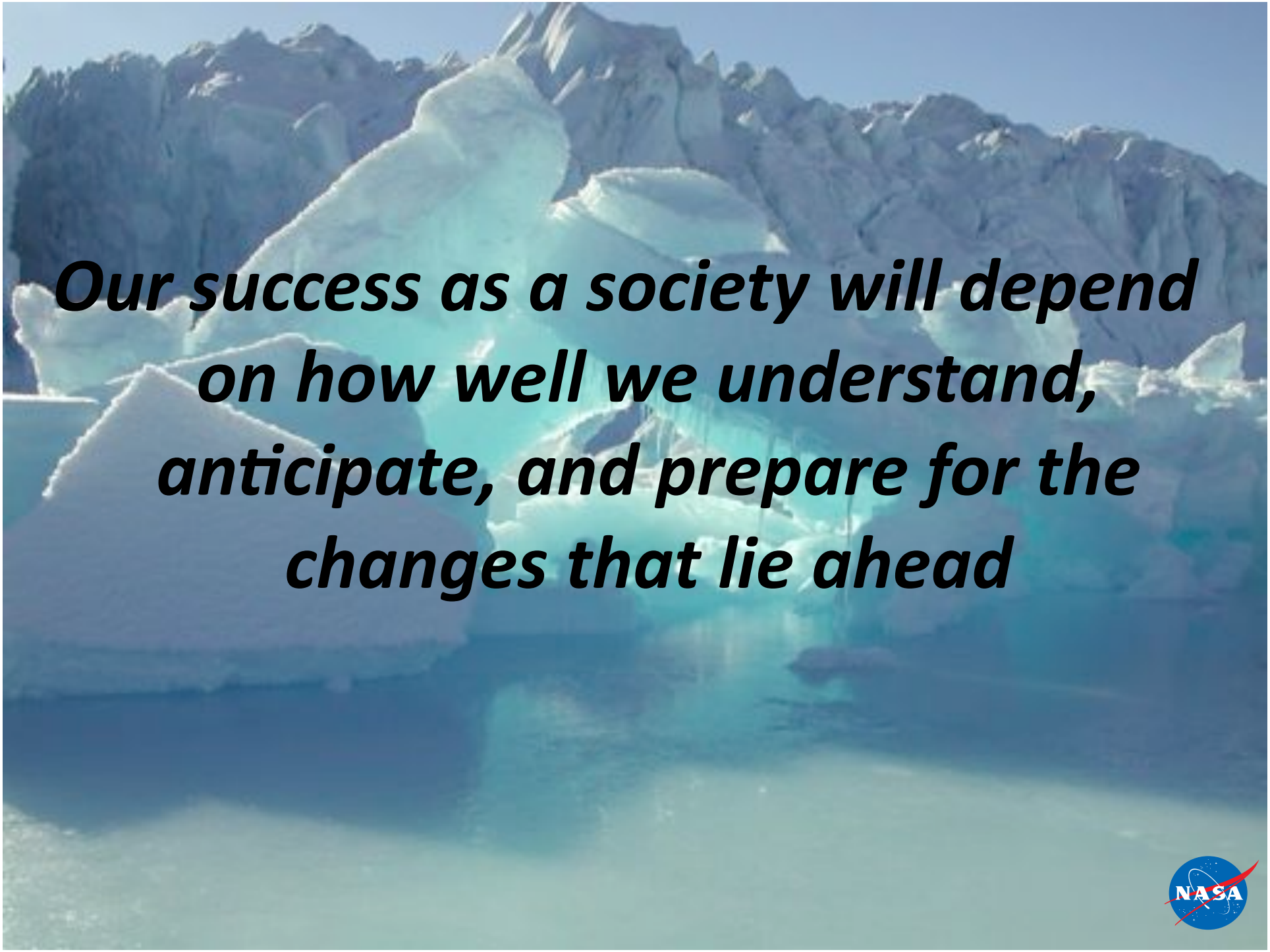

Climatologically we are in unfamiliar territory and experiencing some dramatic changes in the Earth System


Our success as a society will depend on how well we understand, anticipate, and prepare for the changes that lie ahead


Insert your own joke here